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SECRETARY OF THE AIR FORCE**



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**LASER AND OPTICAL RADIATION
PROTECTION PROGRAM**

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This instruction implements requirements from DoDI 6055.15, *DoD Laser Protection Program*, AFPD 48-1, *Aerospace Medicine Enterprise*, the Department of Labor, Occupational Safety and Health Administration (OSHA) Standard, Title 29, Code of Federal Regulations (CFR) and specific requirements from the Food and Drug Administration (FDA) Standard, Title 21, CFR, Part 1040.10, *Laser Products*, and Part 1040.11, *Specific Purpose Laser Products*. The basic elements of the program emulate those of American National Standards Institute (ANSI) Standard Z136.1, *American National Standard for Safe Use of Lasers*. This instruction applies to all Air Force (AF) personnel, AF Reserves, Air National Guard, direct reporting units (DRU) and field operating agencies (FOA). This instruction does not apply to employees working under government contract or private contractors performing work under government contracts, or State employees with traditional Guard positions, who are covered under their organizational standards. Contractors are solely responsible for compliance with Occupational Safety and

Health Administration (OSHA) standards and the protection of their employees unless otherwise specified in their contract. This AFI does not prohibit providing workplace sampling and survey information to contractors based on local arrangements. Send comments and suggested improvements on AF Form 847, *Recommendation for Change of Publication*, through channels, to Surgeon General of the AF, AF Medical Support Agency, Bioenvironmental Engineering Division (AFMSA/SG3PB), 7700 Arlington Blvd Ste 5151, Falls Church, VA 22042-5151. This publication requires the collection and or maintenance of information protected by the Privacy Act (PA) of 1974. The authority to collect and/or maintain the records prescribed in this publication is Executive Order 12196, *Occupational Safety and Health Programs for Federal Employees*, February 26, 1980. Forms affected by the PA have an appropriate PA statement. System of records notice F044 AF SGE Medical Record System applies. This is authorized by 10 U.S.C., Chapter 55, Medical and Dental Care, 10 U.S.C., Sec 8013, Power and Duties of the Secretary of the AF, and Executive Order 9397. Ensure all records created as a result of processes prescribed in this publication are maintained in accordance with Air Force Manual (AFMAN) 33-363, *Management of Records*, and disposed of in accordance with Air Force Records Disposition Schedule (RDS) maintained in the Air Force Records Information Management System (AFRIMS) located from the portal at <https://www.my.af.mil/gss-af61a/afrims/afrims/>. Field activities must send implementing publications to the higher headquarters functional OPR for review and coordination before publishing.

(AFSOC) Air Force Instruction (AFI) 48-139, *Laser Radiation and Optical Protection Program*, 25 Jul 2012, is supplemented as follows: It provides additional clarification of Air Force Special Operations Command (HQ AFSOC) unique requirements for a laser safety program. This instruction is mandatory and applies to all personnel assigned to AFSOC and AFSOC-gained Air Force Reserve Command (AFRC) and Air National Guard (ANG) units. This publication can be supplemented. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with Air Force Manual (AFMAN) 33-363, *Management of Records*, and disposed of in accordance with Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS). Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the AF Form 847, *Recommendation for Change of Publication*; route AF Form 847s from the field through the appropriate functional's chain of command.

SUMMARY OF CHANGES

This document is substantially revised and must be completely reviewed.

(AFSOC) This interim change revises AFI48-139_AFSOCSUP by (1) changing the accessibility statement to the e-Publishing website, and (2) changing the releasability statement of this instruction to no restrictions. A margin bar (i) indicates newly revised material.

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Chapter 1

INTRODUCTION

1.1. Overview. Under the General Duty Clause, Section 5(a)(1) of the Occupational Safety and Health Act of 1970, this instruction incorporates guidance and criteria for the safe use of lasers and laser systems as defined in the American National Standards Institute (ANSI) Z136 Series.

1.1.1. ANZI Z136 classifies lasers according to the type of hazards they present and according to the extent of safety controls required. Classes range from the least hazardous, Class 1, through the most hazardous, Class 4. For Class 1 and Class 2 lasers, the letter M after the number refers to viewing the laser with optical aids so that the laser is magnified. Class 3 is divided into subcategories of Class 3R and Class 3B. The older ANSI designation for Class 3 was Class 3A and Class 3B. ANSI changed Class 3A to Class 3R with the R designating reduced risk. For reference, [Table 1.1](#) below provides a general, but not all encompassing, description the classes.

Table 1.1. Class Description.

Class	Description
1	Not recognized as hazardous
1M	Could be hazardous if viewed with optical aids (telescopes, binoculars or loupes)
2	Could be hazardous if viewed for > 0.25 seconds, on-axis
2M	Increased hazard if viewed with optical aids
3R	Potential direct and diffuse hazard if eye focused
3B	Direct eye or skin exposure hazard
4	Hazardous for direct or scattered exposure

1.1.2. Military specific lasers employ coherent radiation, are lasers and laser systems used for combat, combat training, or classified in the interest of national security, and require AF Laser System Safety Review Board (LSSRB) approval prior to acquisition and/or employment. Examples include, but are not limited to: laser illuminators, designators, range finders, tactical pointers, tactical lasers, and lasers employed to augment explosive ordnance disposal. Some, but not all, military specific lasers are considered Directed Energy Weapons (DEW) per AFI 91-401. The DoD, or its components, are authorized to exempt these lasers from portions or the entirety of Title 21, Code of Federal Regulations, Parts 1010 and/or 1040 IAW with FDA Exemption No. 76EL-01. Hereafter, FDA Exemption No. 76EL-01 will be referred to as simply FDA Exemption.

1.1.3. FDA compliant lasers and laser systems are fully compliant with Title 21, CFR, Parts 1010 and/or 1040 and do not fall under any category defined as military specific lasers. Examples include medical, industrial, laboratory, and communication lasers and laser systems. FDA Compliant Lasers may have a FDA accession number issued to the

manufacturer by the FDA or at least have compliance paperwork on file with the FDA for verification.

1.1.4. For other optical radiation hazards, this instruction is based on the current Threshold Limit Values (TLVs®) for Physical Agents (Non-ionizing Radiation and Fields - Light and Near-Infrared Radiation and Ultraviolet Radiation) published by the American Conference of Governmental Industrial Hygienists (ACGIH®). Optical radiation hazards and controls for welding, cutting, and brazing are delineated in AFOSH Std 91-5, *Welding, Cutting, and Brazing*.

1.1.5. Optical radiation includes incoherent, multi-wavelength (non-laser) sources of radiation in ultraviolet (UV) (180-400 nm), visible (400-700 nm), and infrared (700 nm-1000 µm) wavelength regions. Examples of potentially hazardous broadband optical radiation sources include: intense radiant flashes and thermal energy from pyrotechnics or explosives, arcs, gas and vapor discharges, unshielded fluorescent or incandescent light sources, and UV exposures which can result in cancer from cumulative exposures. Measurement equipment to assess these hazards, generally, is not available at base level; risk assessment and associated controls are typically based on manufacturer discussions and consultation with the USAF School of Aerospace Medicine (USAFSAM) Environmental, Safety, Occupational Health (ESOH) Service Center. To contact the ESOH Service Center, call (toll free) 1-888-232-ESOH (3764), DSN 798-3764, or send email to esoh.service.center@wpafb.af.mil.

1.1.6. This instruction prescribes the use of an AF approved Occupational and Environmental Health - Management Information System (OEH-MIS) to standardize and enhance data entry, management, and reporting. The Defense Occupational and Environmental Health Readiness System-Industrial Hygiene (DOEHRS-IH) is a DoD software program designed to provide a web-based information management system that will store and manage personal OEH exposure information and monitoring data, personal protective equipment (PPE) usage data, and employee health hazard education data.

1.2. Purpose. The purpose of the laser and optical radiation protection program is to protect health while enhancing combat and operational capabilities. The program is designed to define and mitigate laser related risks. This program is a key component of the AF ESOH management system as directed in AFPD 90-8, *Environment, Safety, and Occupational Health*. Effective identification and control of laser and other optical radiation hazards is a force extender. Supervisors and commanders must:

1.2.1. Implement controls to mitigate risks for identified laser and other optical radiation hazards to an acceptable level;

1.2.2. Ensure risk mitigation will be effected through engineering or administrative controls wherever operationally feasible;

1.2.3. Ensure appropriate Individual Protective Equipment (IPE) or PPE will be made available and used when adequate engineering or administrative controls are not feasible/practical to:

1.2.3.1. Enhance workforce and mission capability;

1.2.3.2. Address laser and other optical radiation impacts from AF operations.

Chapter 2

RESPONSIBILITIES

2.1. Secretary of the Air Force (SECAF).

2.1.1. Delegates the responsibility to implement DoDI 6055.15 to SAF/IE in HAF MD 1-18 to establish, administer, and maintain the Tri-Service Laser Injury Hotline to provide a reporting function for laser and optical radiation accidents and incidents, as well as coordinate immediate expert medical advice in the event of an injury or suspected injury to DoD personnel from lasers.

2.1.2. Assistant Secretary of the Air Force for Acquisition (SAF/AQ).

2.1.2.1. Ensures Program Managers (PMs) and Program Execution Officers (PEOs) address laser and other optical radiation health and safety early in development and throughout Integrated Life Cycle Management (ILCM). Further responsibilities of System Program Offices (SPOs), PMs and PEOs are outlined in **paragraph 2.11**.

2.1.2.2. Ensures AF acquisition programs incorporate requirements of federal regulations and this instruction into all stages of system procurement IAW DoDI 5000.1, *Operation of the Defense Acquisition System* (Supplemented by USD(AT&L) Safety Memo (21 Nov 06), Reducing Preventable Accidents). For military specific lasers, when full compliance with 21 CFR 1040.10 and 1040.11 is not operationally feasible, ensure manufacturers request DoD exemption notifications IAW FDA Exemption and DoDI 6055.15.

2.1.3. Deputy Assistant Secretary of the Air Force, Environment, Safety, and Occupational Health (SAF/IEE). Approves and provides policy guidance to the AF Surgeon General's ESOH protection policy and guidance for lasers and optical radiation.

2.2. The Office of the Air Force Surgeon General (AF/SG).

2.2.1. Formulates, publishes, reviews, and executes plans, policies, programs, and budgets for medical support of the occupational and environmental health program.

2.2.2. Establishes AF policy for control of laser and other optical radiation health hazards.

2.2.3. Designates AF Medical Service voting members to the DoD Laser Systems Safety Working Group (LSSWG). The AF-represented voting members are currently AF/SG, 711HPW and AFSEC.

2.2.4. Designates a voting member to the AF LSSRB from AFMSA/SG3PB to evaluate control measures and risks from military specific lasers seeking AF LSSRB approval for purchase/employment and/or DoD exemption notifications from 21 CFR 1040.10 and 1040.11.

2.3. Air Force Medical Support Agency, Bioenvironmental Engineering Division (AFMSA/SG3PB). Proposes and interprets guidance and policy to ensure the effective implementation of the AF OEH protection program for lasers and other optical radiation.

2.4. Air Force Safety Center (AFSEC).

2.4.1. Develops guidance for the AF Directed Energy Weapons safety program.

2.4.2. Implements safety standards for programs associated with potentially hazardous exposures related to lasers, laser systems, and other optical sources.

2.4.3. AFSEC Weapons Safety Division (AFSEC/SEW).

2.4.3.1. Designates a voting member to the DoD LSSWG.

2.4.3.2. Chairs the AF LSSRB.

2.4.3.3. With coordination with the AF LSSRB, approves/disapproves new or modified military specific use lasers reviewed by the AF LSSRB.

2.4.3.4. Awards DoD exemption notifications to manufacturers of military specific lasers that cannot meet the federal laser specification requirements in 21 CFR 1040.10 and 1040.11. Ensures DoD exemption notification requests are reviewed by the AF Staff Judge Advocate.

2.4.3.5. Maintains a repository of all military specific lasers approved/disapproved for acquisition/fielding through the AF LSSRB.

2.4.3.6. Projects and prioritizes systems requiring independent laser hazard evaluations and review by the AF LSSRB prior to acquisition/fielding.

2.5. HQ Air Force Inspection Agency (HQ AFIA). Implements programs to assess laser safety compliance with this instruction, as well as all applicable federal regulations concerning the safe use of lasers and other optical radiation systems.

2.6. HQ Air Force Judge Advocate (AF/JAO).

2.6.1. Reviews legal issues associated with the use of military specific lasers by AF personnel.

2.6.2. Designates an AF LSSRB member to assess legal risk arising from use of military specific lasers and conformance with FDA exemptions and federal regulations; makes recommendations to AF LSSRB chair (AFSEC/SEW).

2.6.3. Reviews requests for DoD exemption notifications and provides recommendations to AFSEC/SEW.

2.6.4. The Base Staff Judge Advocate in collaboration with the Installation Laser Safety Officer (ILSO) and in consultation with AF/JAO and/or AFLOA JACE, reviews all investigations conducted in accordance with A4.2. for legal sufficiency.

2.7. HQ Air Force Civil Engineer Support Agency (HQ AFCESA/CES). Establishes criteria for fire protection and life safety in laser facilities and laser system support facilities.

2.8. MAJCOM, FOA and DRU.

2.8.1. Authorizes the use of AF LSSRB-approved military specific lasers and FDA-compliant laser systems. This applies to lasers and laser systems procured through any method including formal DoD acquisition and Commercial Off-The-Shelf/Non-Developmental Items (COTS/NDI).

2.8.2. Ensures safety and health assessments are accomplished as necessary in support of the AF LSSRB. Implements programs to monitor laser safety compliance with this instruction

and applicable federal regulations concerning the safe use of lasers and other optical radiation systems.

2.8.3. Through coordination with acquisition personnel and AFSEC/SEW, ensures military specific lasers have a written AF LSSRB approval prior to fielding.

2.8.4. Maintains a list of approved lasers and laser systems (by nomenclature) which have been authorized within their area of responsibility.

2.9. Air Combat Command (ACC). Through coordination with 77 AESG System Program Office (SPO), issues overall Safe-to-Fly approval of Laser Eye Protection (LEP) for aircrew.

2.10. Air Force Materiel Command (AFMC).

2.10.1. Plans, programs, and budgets for RDT&E related to AF lasers and laser systems, to include laser protective devices, laser technologies, and laser control measures based on priorities provided by AFMSA/SG3PB and AFSEC/SEW.

2.10.2. Ensures a system safety program consistent with MIL-STD-882E, *Standard Practice for System Safety*, and AFI 91-202, *The US Air Force Mishap Prevention Program*, Chapter 9, *System Safety*, is established to support development or modification of systems including lasers and laser systems or other optical radiation sources. Initiates the system safety program as early as possible to ensure effective total life cycle risk. In consultation with AFSEC/SEW, ensures contracts for operation, modification, and repair of laser systems incorporate safety controls IAW the ANSI Z136 Series and MIL-STD-1425A.

2.10.2.1. Establishes life-cycle controls on military specific lasers to comply with accountability and disposal requirements IAW FDA Laser Notice No. 52 and DoDI 4160.21-M. Ensures controls and warnings are in place to prevent sale, surplus, or distribution of military specific lasers outside of DoD. Military specific lasers must be disposed of IAW DoDI 4160.21-M.

2.10.2.2. Affiliated SPOs, PMs, and PEOs follow guidelines in paragraph 2.11.

2.10.3. 711th Human Performance Wing.

2.10.3.1. Provides operational consultation services.

2.10.3.2. Designates a voting member to the DoD Laser Systems Safety Working Group (LSSWG).

2.10.3.3. Human Effectiveness Directorate, Directed Energy Bioeffects Division, Optical Radiation Branch (711 HPW/RHDO).

2.10.3.3.1. Conducts research on biological effects of lasers, broadband, and other forms optical radiation. Provides subject matter expertise for national and international standards-setting bodies such as ANSI, Institute of Electrical and Electronics Engineers (IEEE), International Commission on Non-Ionizing Radiation Protection (ICNIRP), and Standardization Agreement (STANAG).

2.10.3.3.2. Evaluates and recommends LEP technologies for use against threats and hazardous lasers. Coordinates development and approval of LEP for transition to AF operational use, and provides guidance during Safe-to-Fly evaluation processes for aircrew LEP.

2.10.3.3.3. Designates a voting member to the AF LSSRB to evaluate control measures and risks from military specific lasers seeking AF LSSRB approval for acquisition/fielding and/or DoD exemption notifications from 21 CFR 1040.10 and 1040.11.

2.10.3.3.4. Maintains the capability to conduct independent laser hazard evaluations of laser and laser systems seeking AF LSSRB approval for acquisition/fielding and/or DoD exemption notifications from 21 CFR 1040.10 and 1040.11. Maintains a repository of hazard evaluations conducted for AF LSSRB approved/disapproved lasers and laser systems. Provides evaluation information to USAFSAM Occupational/Environmental Health Division (USAFSAM/OE) for health risk assessment and accident/incident investigations and for dispersment to laser safety officers.

2.10.3.4. USAFSAM Occupational/Environmental Health Division (USAFSAM/OE).

2.10.3.4.1. Provides AF-wide consultative services on the adequacy of laser and other optical radiation protection devices, materials, hazard assessments, exposure control, medical surveillance, and control measures.

2.10.3.4.2. Serves as AF/SG technical center for all issues concerning laser and other optical radiation health and safety. Coordinates with other services and agencies to evaluate, assess, and resolve laser safety issues.

2.10.3.4.3. Designates a voting member to the AF LSSRB to evaluate control measures and risks from lasers and laser systems seeking AF LSSRB approval for acquisition/fielding and/or DoD exemption notifications from 21 CFR 1040.10 and 1040.11.

2.10.3.4.4. Maintains the Tri-Service Laser Injury Hotline to coordinate investigating/reporting/documenting DoD accidents/incidents involving laser or laser systems with the DoD Laser Accident/Incident Response Group, as necessary, IAW DoDI 6055.15.

2.10.3.4.5. Maintains the capability to perform exposure re-creations to evaluate suspected overexposures from lasers and other optical radiation sources. Forwards exposure investigation reports to the Army Institute of Public Health, Tri-Service Vision Conservation and Readiness Program (TVCRP) for addition to the DoD official repository. Further details regarding accident/incident investigation of suspected overexposures are outlined in [Attachment 4](#).

2.10.3.4.6. Maintains a repository on the hazard characteristics of military specific lasers, FDA-Compliant Lasers, laser radiation protective devices, and optical radiation sources used within the AF and makes this repository available to installation personnel.

2.10.3.4.7. Develops formal training for AF personnel on laser and optical radiation safety through the USAFSAM Department of Bioenvironmental Engineering (USAFSAM/OED).

2.10.3.5. USAFSAM, Aeromedical Consultation Service, Aerospace Ophthalmology Branch (USAFSAM/FEC).

- 2.10.3.5.1. Provides consultative examinations in ophthalmology and dermatology for AF personnel. All other consultations must have approval from the 711HPW/CC.
- 2.10.3.5.2. Develops methods to evaluate injuries or suspected overexposures associated with lasers and optical radiation.
- 2.10.3.5.3. Recommends medical surveillance requirements for active aircrew members, in addition to those stipulated in this AFI or the ANSI Z136 Series.
- 2.10.4. 77th Aeronautical Systems Group (77 AESG/CC).
 - 2.10.4.1. Conducts acquisition and sustainment of aircrew LEP.
 - 2.10.4.2. Assists 711 HPW/RHDO, test organizations, and MAJCOMs with assessments of LEP and other protective technologies/devices under development for aircrew.
 - 2.10.4.3. Manages the Safe-to-Fly health and safety approval processes for aircrew LEP throughout acquisition and fielding process. Safe-to-Fly recommendations are used by the MAJCOM, COCOM, AFRC, ANG, FOA, or equivalent, to authorize fielding of aircrew LEP or developmental LEP used by aircrew.

2.11. SPOs, PMs, and PEOs.

- 2.11.1. Coordinate projected laser and other optical radiation system acquisitions, performance specifications, and measurements with AFSEC/SEW as early as practical in the procurement process. Notify AFSEC/SEW if the system has a potential to be used by other services so measurements and evaluations can be jointly coordinated. (Note: most military specific lasers are likely to be used jointly.)
- 2.11.2. Initiate the system safety program as early as possible in the development or modification cycle to ensure effective total life cycle risk and cost management.
- 2.11.3. Evaluate and recommend LEP and other protective technologies for complex lasers/laser systems technologies, i.e. for non-military or threatening lasers. Evaluations shall occur early within development of new systems to ensure safe operations of the systems.
- 2.11.4. Where full compliance with 21 CFR 1040.10 and 1040.11 conflicts with operational requirements, ensure manufacturers request DoD exemption notifications from the AF LSSRB IAW FDA Exemption and DoDI 6055.15.
 - 2.11.4.1. Coordinate through AFSEC/SEW to have an independent evaluation conducted of any laser or optical radiation system seeking approval for acquisition/fielding from the AF LSSRB once the system is in final configuration and ready for fielding.
- 2.11.5. Include health and safety information, cautions, and warnings in Standard Operating Procedures (SOPs), Technical Orders (TOs), or equivalent.

2.12. Installation Commander.

- 2.12.1. Establishes policies, procedures, and instructions to implement this instruction at the installation level.
- 2.12.2. Delegates authority to the ILSO to suspend installation operations involving the operation of laser or other optical radiation sources that pose a significant health risk to

personnel, are in clear violation of regulations or requirements, or can negatively impact AF operations, materiel, or real estate.

2.12.3. Establishes an installation laser and optical radiation protection program that conforms to this instruction.

2.12.4. Designates, in writing, a qualified 43E3X to serve as the ILSO. Further guidance on ILSO training qualifications are detailed in [Attachment 2](#).

2.13. Installation Laser Safety Officer (ILSO).

2.13.1. Adheres to the LSO duties and responsibilities listed in ANSI Z136.1, those detailed below, and those specified in Chapter 3 and Attachment 2 of this instruction.

2.13.2. Develops and manages an installation laser and optical radiation safety program.

2.13.3. Assists the installation commander in developing and maintaining policies, procedures, and instructions to meet this instruction.

2.13.4. Incorporates laser and optical radiation hazard evaluations into the special surveillance processes described in AFI 48-145.

2.13.5. Establishes a formal Laser Safety Committee at installations with three or more units using Class 3B and/or Class 4 FDA-Compliant Lasers or military specific lasers.

2.13.6. Coordinates suspected laser accidents/incidents as detailed in Attachment 4 of this instruction.

2.13.7. Ensures the outdoor use of lasers adheres to federal, military, state, and local regulations. (See [Chapter 3](#).)

2.13.8. Ensures each unit employing military specific lasers maintains a copy of the AF LSSRB approval letter and hazard evaluation or safety summary for each system type.

2.13.9. Verifies the unit LSO training is IAW this instruction.

2.13.10. Exercises authority granted by the installation commander according to **paragraph 2.12.2**. Reports deviations from this instruction to the unit commander and, as necessary, AFMSA/SG3PB, as appropriate.

2.13.11. Maintains a listing of hazardous laser and optical radiation equipment. Depending on the equipment, the list could include nomenclature, classification, wavelength, unit of assignment (Class 3B and 4 lasers), or other hazard descriptors.

2.13.12. Accomplishes and documents completion of required training IAW [Attachment 2](#).

2.13.13. Consults with USAFSAM/OE or the ESOH Service Center, as needed, on issues such as hazard evaluations, controls, investigations and/or FDA exemptions.

2.14. Medical Treatment Facility (MTF) Commander / Mission Support Commander (MSC).

2.14.1. Develops policy, procedures, and instructions to implement safety and occupational health aspects of this instruction.

2.14.2. Aerospace Medicine.

2.14.2.1. Ensures aircrew only use LEP certified Safe-to-Fly by the applicable MAJCOM, COCOM, AFRC, ANG, or equivalent.

2.14.2.2. Ensures examinations and care are provided immediately for all suspected overexposures involving lasers or other optical radiation sources.

2.14.2.3. Assists the ILSO with investigations of all suspected overexposures involving lasers or other optical radiation sources.

2.14.3. Public Health (PH).

2.14.3.1. Initiates and completes, with Bioenvironmental Engineering (BE) and Installation Occupational and Environmental Medicine Consultant (IOEMC), an occupational illness investigation in the AF Safety Automated System for persons identified as having been potentially overexposed to lasers or other optical radiation.

2.14.3.2. Installation Occupational & Environmental Health Working Group (IOEHWG) reviews and approves recommended medical surveillance examination (MSE) requirements, in addition to those outlined in the ANSI Z136 Series, IAW AFI 48-145, *Occupational Health Program*, and AFMAN 48-146, *Occupational and Environmental Health Program Management*.

2.14.3.3. Administratively supports the IOEMC to ensure MSEs are conducted according to the approved IOEHWG recommendations and IAW AFI 48-123, *Medical Examination and Standards*.

2.14.3.4. Ensures medical follow-up examinations are conducted for persons identified as having been potentially overexposed to lasers or other optical radiation. Further guidance is provided in [Attachment 4](#).

2.15. Installation Safety (SEG).

2.15.1. Reviews and recommends policies and procedures to prevent mishaps from ancillary safety hazards such as electrocution, fire hazards, etc. Periodically evaluates procedures and inspects facilities to ensure compliance with federal, military, state, and local safety requirements.

2.15.2. Investigates accidents/incidents related to exposures causing operational impacts, causing damage to systems and/or sensors, or ancillary safety hazards associated with a laser or any optical radiation system IAW AFI 91-204, *Investigation and Reporting US Air Force Mishaps*.

2.16. Installation Civil Engineering Fire and Emergency Services.

2.16.1. Evaluates procedures and facilities IAW National Fire Protection Association (NFPA) 115, *Standard for Laser Fire Protection*.

2.16.2. Develops emergency response plans, procedures and training lesson plans for firefighting operations involving facilities and systems utilizing Class 3B or Class 4 lasers which have the potential to be a fire hazard (e.g., laboratory/research lasers, EOD, or tactical lasers).

2.16.3. Ensures firefighters assigned to locations with lasers or any optical radiation systems having the potential to be a fire hazard receive initial and annual training on emergency

response to accidents/incidents involving those systems. In addition to fire hazard training, this training will include laser safety training developed by USAFSAM/OED, as noted in **paragraph 2.10.3.4.7.**

2.17. Installation Contracting Office.

2.17.1. Ensures government contractors implement this instruction for any purchase of Class 1M, 2M, 3R, 3B, or 4 FDA-Compliant Lasers or military specific lasers that impact AF property or personnel. Includes a requirement for contractors who bring hazardous lasers and laser systems (Class 3B or 4) on AF property to provide laser hazard and control information to the ILSO and/or Unit LSO (ULSO) for authorization prior to use.

2.17.2. Informs contractors to notify the ILSO, at least 30 days in advance of a contractor performing operations using military specific lasers, or Class 3B or 4 FDA-Compliant Laser systems that impact AF property or personnel. Notifies ILSO prior to a contractor bringing Class 3B or 4 lasers on the installation.

2.18. Unit Commander.

2.18. (AFSOC)Commanders of Squadrons/Units Which Own or Maintain Lasers and Units Which Might be Exposed to Lasers Including Flying Squadrons shall:

2.18.1. Develops and maintains policies, procedures, and instructions to implement this instruction at the unit level.

2.18.1. (AFSOC) Maintain a laser radiation protection program to identify and document all hazardous lasers (Class 3b and above) and establish/enforce standards for safe use. (T-2).

2.18.2. Designates a qualified ULSO. Further guidance on ULSO qualifications are detailed in **Attachment 2**. The ILSO could fulfill this role if agreed upon between the Unit Commander and the ILSO.

2.18.3. (Added-AFSOC) Ensure all of their personnel, including aircrew, who use, operate, repair lasers, or might otherwise be exposed to lasers in their duties, receive initial (T-0) and annual (T-2) laser safety training IAW 11-301V4 (for aircrew).

2.18.4. (Added-AFSOC) Ensure all personnel that have a potential exposure to lasers are equipped with appropriate PPE including LEP as determined by the supporting Bioenvironmental Engineering (BE) Flight. (T-2).

2.18.5. (Added-AFSOC) During deployments, the commander must ensure that all personnel using lasers are adequately prepared. In addition to training, personnel may be required to wear LEP while performing operations involving not only the use of lasers, but also the potential of exposure from foreign sources. (T-2).

2.19. Unit Laser Safety Officer (ULSO).

2.19.1. Adheres to the LSO duties and responsibilities detailed below and those specified in **Chapter 3**.

2.19.2. Is knowledgeable on the skill sets required to perform specific duties as an Aircrew LSO, Industrial LSO, Medical LSO, Range LSO, Research LSO, or Tactical LSO, as applicable. (See **Attachment 2**.)

2.19.3. Develops and manages a unit laser and optical radiation safety program.

- 2.19.4. Develops and maintains unit policies, procedures, and instructions to meet this instruction.
- 2.19.5. Assists the unit commander in developing policies, procedures and/or instructions to meet this instruction as detailed in [Attachment 2](#).
- 2.19.6. Coordinates suspected laser accidents/incidents as detailed in [Attachment 4](#).
- 2.19.7. Acts as a POC for the unit on laser and other optical radiation safety matters and maintains lines of communication with the ILSO, BE, SEG, and PH personnel.
- 2.19.8. Ensures supervisors and workers are aware of and follow laser and other optical radiation safety procedures in this instruction, Concepts of Operations/Employment (CONOPS/CONEMPS), Tactics, Techniques, and Procedures (TTPs), SOPs, TOs, manuals, unit instructions and other applicable guidance documents.
- 2.19.9. Coordinates laser and other optical radiation evaluation activities with unit command, supervisory personnel, and the ILSO.
- 2.19.10. Suspends unit operations involving the operation of laser or any optical radiation sources that pose a significant health risk to personnel, are in clear violation of regulations or requirements, or can negatively impact AF operations, materiel, or real estate. Coordinates with the ILSO as needed to maintain safe operation.
- 2.19.11. Ensures the outdoor use of unit lasers adheres to federal, military, state, and local regulations. (See [Chapter 3](#).)
- 2.19.12. Maintains a copy of the AF LSSRB approval letter and hazard evaluation for each type of military specific laser acquired by the unit (if applicable).
- 2.19.13. Maintains accountability for all Class 3B and 4 lasers and laser systems and all military specific lasers, regardless of class, possessed by the unit.
- 2.19.14. Ensures that no military specific laser is released outside of the AF unless it is transferred to another DoD Service that has approved the use of the system, has been brought into full compliance with 21 CFR 1040.10 & 1040.11, and has the compliance paperwork filed with the FDA or destroyed IAW with DODI 4160.21-M.

2.20. Workplace Supervisor.

2.20. (AFSOC)Workplace Supervisors of Units Operating Lasers Shall:

- 2.20.1. Adheres to the laser supervisor duties and responsibilities detailed below and those specified in [Chapter 3](#).
- 2.20.2. Assists the ULSO in implementing this instruction by developing unit procedures and provides training for workers and visitors, as applicable.
- 2.20.3. Ensures lasers and optical radiation systems are either FDA complaint, or in the case of military specific lasers, have been approved by the AF LSSRB prior to acquisition/fielding. When necessary, requests approval from the AF LSSRB through AFSEC/SEW for military specific lasers.
- 2.20.4. Any approved laser system shall be added to the HAZMAT pharmacy inventory.

2.20.5. In the event of a suspected laser accident/incident, ensures medical treatment is sought immediately.

2.20.6. Ensures the unit commander, ILSO, ULISO, BE, SEG and PH are notified immediately of suspected overexposures.

2.20.7. Immediately reports to the ULISO any suspected laser or optical radiation overexposure, unsafe conditions, and/or change in usage that could change the hazard assessment.

2.20.8. Ensures users of any Class 1M, 2M, 3R, 3B or 4 FDA-Compliant Laser, military specific laser, or optical radiation sources are trained upon initial assignment to the unit and annually thereafter. This extends to those individuals that conduct routine maintenance on any Class 3B or Class 4 embedded lasers. Criteria for training are detailed in the ANSI Z136 Series and **Attachment 2** of this instruction.

2.20.9. Ensures incidental personnel (e.g., personnel, such as housekeepers, who are not allowed to work around the laser when it is “on”) are adequately trained in procedures and policies in areas with active lasers or other optical radiation systems. As a minimum, personnel shall be trained on safe work practices and descriptions of warning signs and hazard zones.

2.20.10. Ensures visitors receive training, PPE such as LEP or skin protection (when required), and permission to enter a laser controlled area. As a minimum, visitors shall be trained on safe work practices, specific hazards, and procedures to follow in the event of a suspected overexposure to laser or other optical radiation.

2.20.11. Documents training regarding safe use and hazards from lasers and optical radiation sources. Verifies the individual user’s annual safety training IAW this instruction.

2.20.12. Ensures the outdoor use of lasers and optical radiation systems adheres to federal, military, state, and local regulations. (See **Chapter 3**.)

2.20.13. **(Added-AFSOC)** Develop a Laser Radiation Protection Program when operating ANSI class 3B or 4 lasers. (T-2).

2.20.13.1. **(Added-AFSOC)** The program must be approved and reviewed annually by the supporting Bioenvironmental Engineer. (T-3).

2.20.13.2. **(Added-AFSOC)** Maintain a copy of the ULISO appointment letter signed by the unit commander. (T-3).

2.20.13.3. **(Added-AFSOC)** Maintain a copy of AFI 48-139. (T-3).

2.20.13.4. **(Added-AFSOC)** Maintain a copy of this supplement. (T-3).

2.20.13.5. **(Added-AFSOC)** Maintain a copy of the American National Standards Institute (ANSI) Z136.1, *American National Standard for Safe Use of Lasers*.

2.20.13.6. **(Added-AFSOC)** Maintain a copy of the American National Standards Institute (ANSI) Z136.6, *American National Standard for Safe Use of Lasers Outdoors*.

2.20.13.7. **(Added-AFSOC)** Develop operating procedures to supplement existing system specific technical orders and publications to include, as applicable: (T-3).

- 2.20.13.7.1. **(Added-AFSOC)** Alignment, calibration, firing, and system maintenance procedures.
- 2.20.13.7.2. **(Added-AFSOC)** Laser control measures, such as key controls, nominal hazard zone areas, interlocks, beam stops, warning systems, service access panels, protective housing, emission delays, and remote firing.
- 2.20.13.7.3. **(Added-AFSOC)** Protective equipment, such as laser eye protection, skin protection, and ancillary hazard protection from electrical shock and toxic chemicals that are sometimes part of the laser system.
- 2.20.13.8. **(Added-AFSOC)** Maintain copies of any manuals that were provided with the laser, incident reports, investigations, and references to any classified documents. (T-3)
- 2.20.13.9. **(Added-AFSOC)** Maintain a laser inventory. As a minimum, the laser inventory should contain the following:
 - 2.20.13.9.1. **(Added-AFSOC)** A description of each different model of laser used by the unit.
 - 2.20.13.9.2. **(Added-AFSOC)** The quantity of lasers or laser systems that have an operational or military training use.
 - 2.20.13.9.3. **(Added-AFSOC)** The manufacturer's name of each different model of laser.
 - 2.20.13.9.4. **(Added-AFSOC)** A listing of all the serial numbers of military exempt lasers.
 - 2.20.13.9.5. **(Added-AFSOC)** The ANSI laser classification for each different model of laser.
 - 2.20.13.9.6. **(Added-AFSOC)** Intended operational use of the laser. (Illuminator, designator, Visible Pointer, IR Pointer, etc.).
 - 2.20.13.9.7. **(Added-AFSOC)** Power, wavelength, NOHD, and skin hazard distance.
- 2.20.13.10. **(Added-AFSOC)** Every time the laser inventory is updated, the supporting Bioenvironmental Engineering Flight shall be contacted so a health risk assessment may be conducted. If there is no Bioenvironmental support available, the ULISO shall contact the Command Laser Safety Officer. (T-2).

2.21. Individual.

- 2.21.1. Controls laser and optical radiation hazards by following procedures in this instruction, CONOPs, TTPs, SOPs, TOs, manuals, and unit instructions.
- 2.21.2. Ensures lasers and laser systems are either FDA complaint or in the case of military specific lasers, have been approved by the AF LSSRB prior to acquisition/fielding.
- 2.21.3. Ensures warning signs, safety devices, and PPE are functional and in place before operating lasers or optical radiation systems.

2.21.4. Immediately reports to the workplace supervisor and the ULSO any suspected laser or optical radiation overexposure, unsafe conditions, and/or change in usage that could change the hazard assessment.

2.21.5. Ensures the outdoor use of lasers adheres to federal, military, state, and local regulations. (See [Chapter 3](#).)

2.22. (Added-AFSOC) Medical Commanders, Including Operational Support Medical Unit (OSM) and Ambulatory Care Units (ACU) should ensure:

2.22.1. (Added-AFSOC) OSM and ACU Flight Surgeons, Physician Assistants, and Independent Medical Duty Technicians (IDMTs) are trained to conduct the following tests and examinations: Visual acuity, Amsler grid, fundusoscopic examination, color vision, and slit lamp examination (as available). If any providers are not current with stated exams, arrangements for training should be coordinated with local Optometry. Any abnormal results will be referred to the appropriate specialist.

2.23. (Added-AFSOC) Intelligence shall:

2.23.1. (Added-AFSOC) Maintain, monitor, and provide current intelligence pertaining to anti-personnel laser threat capabilities. Provide tailored briefings to appropriate personnel on anti-personnel laser threat capabilities prior to operations in/over hostile territory. (T-3).

2.23.2. (Added-AFSOC) Debrief all personnel who encounter hostile laser activity. (T-2).

2.23.3. (Added-AFSOC) Submit debriefing reports of hostile laser activity in a timely manner via record message traffic to higher headquarters and the National Air and Space Intelligence Center, Wright-Patterson AFB, OH. Lateral reporting to National Center for Medical Intelligence, as directed, will be accomplished. (T-2).

Chapter 3

INSTALLATION PROGRAM

3.1. General Guidelines.

3.1.1. The program elements of this instruction augment those of the ANSI Z136 Series and are shared among workplace supervisors and other functional areas such as BE, PH, SEG, and healthcare providers. However, the ILSO has overall responsibility to the installation commander for the installation laser safety program, and as such shall be designated in writing, by the installation commander, as the final authority on all laser operations conducted within the installation's areas of responsibility.

3.1.2. The fundamental aspects of a laser and optical radiation protection program include training, evaluation and control of direct and ancillary laser hazards, medical surveillance/examinations, and accident/incident investigation.

3.1.3. Personnel will not be intentionally exposed to laser radiation in excess of the maximum permissible exposure (MPE) levels as defined in ANSI Z136.1, and unnecessary exposures to laser radiation below the MPE will be avoided. This does not apply to patients receiving medical treatment or to human targets of directed energy weapons.

3.1.4. If an organization uses Class 3B or Class 4 lasers, the LSO at each level (ILSO, and ULSO) shall be appointed by the commander at the appropriate level.

3.1.5. In addition to the ILSO, specialized ULSOs will be appointed based on the primary mission of the unit. ULSOs will consist of aircrew, industrial, medical, range, research, or tactical LSOs.

3.2. LSO and User Training Criteria.

3.2.1. Laser safety training shall be provided initially and annually to users of any Class 1M, 2M, 3R, 3B or 4 FDA-Compliant Lasers or military specific laser, IAW with the training requirements/topics listed in the ANSI Z136 Series, military directives and requirements, and training specific to the laser(s) and laser system(s) used by the unit.

3.2.2. AF LSO training requirements are based upon the primary mission of the unit to which the LSO is assigned and require varying levels of knowledge and training for each area. In consultation with the ILSO, the ULSO shall determine what, if any, training is commensurate with the laser hazards accessible at the unit level. Specific definitions and the training requirements for each type of LSO are provided in Attachment 2.

3.2.3. **(Added-AFSOC)** Bioenvironmental Engineers have received laser safety training and typically serve as the Installation Laser Safety Officer (ILSO). The ILSO is responsible for conducting Unit Laser Safety Officer training. Units that are not supported by an ILSO can be trained by the Command Bioenvironmental Engineer.

3.2.4. **(Added-AFSOC)** AFSOC Unit Laser Safety Officer (LSO) training is required upon initial duty assignment but there is no annual refresher training required. A course outline is provided at Attachment 5, highlighting the different topic areas that should be covered.

3.2.5. **(Added-AFSOC)** Night vision goggle (NVG) training (conducted IAW AFI 11-202V1, *Aircrew Training*) will incorporate effects of lasers. MAJCOM or Wing Aerospace and Operational Physiologists can be consulted as necessary.

3.3. Hazard Evaluations.

3.3.1. A hazard evaluation shall be conducted and controls established prior to use or maintenance of all Class 3B or 4 FDA-Compliant Lasers or military specific lasers. This requirement shall include embedded Class 3B and Class 4 lasers if the use or maintenance could potentially expose personnel. Additionally, this requirement applies for the equivalent lasers and laser systems classified under prior ANSI, International Electrotechnical Commission (IEC), or FDA classification schemes.

3.3.2. The most recent versions of the ANSI Z136 Series shall be adopted to determine classification of military specific lasers, calculate/identify beam and non-beam hazards, calculate nominal ocular hazard distances (NOHD), nominal skin hazard distance (NSHD), nominal hazard zones (NHZ), optical density (OD) and determine controls. The MPE values from ANSI Z136.1 shall not be exceeded unless part of an approved human-use protocol or medical procedure.

3.3.3. If an Installation or ULISO suspects and validates that re-classification of a laser may result in a lower hazard class, then the classification and labeling should be updated IAW ANSI Z136 Series.

3.3.4. For visible lasers used in an outdoor environment, the hazard evaluation should include determining ranges associated with visual interference levels using ANSI Z136.6.

3.3.5. For broadband optical radiation hazards, TLV[®]s as listed in the ACGIH[®] TLV[®] guidebook shall not be exceeded.

3.3.6. For directed energy weapons (DEWs), AFI 91-401 shall be followed.

3.3.7. Additional information concerning hazards evaluations may be obtained by contacting the ILISO, BE, or the ESOH Hotline. To contact the ESOH Service Center, call (toll free) at 1-888-232-ESOH (3764), DSN 798-3764, or send email to esoh.service.center@wpafb.af.mil.

3.4. Laser Hazard Controls. The purpose of controls is to reduce the risk of exposure to the skin and eyes even with the presence of PPE, and to prevent exposure to visible laser radiation at levels that interfere with critical tasks. For purposes of this instruction, exposure is defined as “unprotected exposure,” i.e. exposure without PPE. PPE is generally considered a secondary control, to be used in the event primary controls fail or cannot be implemented due to a negative mission impact. Refer to **Attachment 3** for additional information on laser hazard controls and for ancillary hazards associated with laser systems.

3.5. Medical Examinations for Laser Users and Some Broadband Optical Sources.

3.5.1. General. Any medical examination requirements are limited to personnel who routinely work in a laser environment with Class 3B or Class 4 lasers. Users include operators, technicians, engineers, and maintenance/service personnel, etc., working with or around these lasers. Specific personnel working in a laser-operating environment, who may be exposed to laser emissions, include, but are not limited to, laboratory, aircrew, combat control teams, special operations forces and laser range personnel. Personnel who do not

routinely operate in a laser environment may be considered incidental personnel not requiring examination.

3.5.2. Medical Examination Requirements and Frequency for Lasers and Laser Systems.

3.5.2.1. Laser users and personnel working in a laser-operation environment shall be subject to baseline eye exams and post employment eye exams to be determined by a qualified provider.

3.5.2.1. (AFSOC) Personnel who are functionally using or maintaining ANSI Class 3B or Class 4 lasers in the routine course of duties shall receive a baseline exam to include ocular history, visual acuity, and Amsler Grid. Additionally, a retinal photograph is required. (T-2).

3.5.2.1.1. (Added-AFSOC) Examples of personnel requiring retinal photographs include: pilots using command pointers, battlefield airmen, rotary-wing and tilt-wing gunners using laser sites, applicable maintenance workers, applicable range personnel, and other personnel who routinely use ANSI Class 3B or Class 4 lasers in the course of their duties.

3.5.2.2. Laser users and personnel who work with UV broadband optical sources with a history of photosensitivity or working with UV lasers shall be subject to a baseline and subsequent skin examinations to be determined by a qualified provider.

3.5.2.3. Post-employment medical examinations shall be performed as soon as practical subsequent to actual termination of duties involving Class 3B and Class 4 lasers (i.e. AFSC change, retirement, or separation).

3.5.2.4. Following any actual or suspected overexposure to laser radiation, the pertinent examinations as determined by a qualified provider shall be performed.

3.5.3. Documentation. Results of all examinations shall be recorded on AF Form 600, *Chronological Record of Medical Care*, or equivalent, and filed in the individual's medical record. Records should be retained for the individual's working lifetime plus 30 years.

3.5.4. A qualified provider at the installation level shall determine medical examination requirements and frequency for users of optical radiation sources and shall reflect requirements in local regulations.

3.6. Accidents/Incidents. Any accidents/incident involving a suspected laser, broadband or other optical radiation overexposure, visible laser illumination that negatively impacts mission operations or a laser exposure causing material damage to personnel, AF equipment, systems or sensors shall be investigated and documented. Additional information on accident/incident reporting is contained in [Attachment 4](#).

3.6.1. (Added-AFSOC) When a lasing incident occurs during a flying mission, the aircraft commander must make the operational risk management decision to continue or abort the mission. This assessment must include human performance limitations from any apparent injuries (e.g. vision loss, skin burns), sensor damage, and the possibility that the lasing may be repeated.

3.6.2. (Added-AFSOC) All cases of suspected lasing incidents shall be reported by the involved aircrew to the Command Post or deployed Air Operations Center (AOC) as soon as

operationally feasible. (T-2) The Command Post will immediately notify the Chief of Safety, Chief of Aerospace Medicine (or on-call Flight Surgeon) and the ILSO. (T-2).

3.6.3. **(Added-AFSOC)** The ILSO will conduct an incident investigation. (T-2) A ULISO will conduct the investigation for AFSOC units on non-AFSOC bases with the assistance of the Special Operations Group (SOG) Bioenvironmental Technician, STG Surgeon or Command Bioenvironmental Engineer.

3.6.4. **(Added-AFSOC)** Appendix C of the *USAFSAM Laser Injury Guidebook* contains a checklist and form which can be used to conduct the incident investigation and medical exam, respectively.

3.6.5. **(Added-AFSOC)** All NVGs in use during a potential lasing event should be thoroughly operationally tested prior to storing the items. Any NVG showing signs of damage should be sequestered.

3.6.6. **(Added-AFSOC)** 24.1. The FSO or Group Surgeon will report the event to HQ AFSOC/SG, DSN 579-2269. (T-2).

3.7. Special Considerations.

3.7.1. Medical Lasers. Medical laser assessment may require additional expertise. USAFSAM/ OEHH shall provide additional guidance if a health/medical physicist is not assigned to the installation. Guidance to assess medical lasers is provided in ANSI Z136.3, *American National Standard for Safe Use of Lasers in Health Care Facilities* and American Association of Physicists in Medicine (AAPM) Report No. 73, *Medical Lasers: Quality Control, Safety Standards, and Regulations*.

3.7.2. Range Operations and Other Outdoor Laser or High Intensity Light Use.

3.7.2.1. Requirements for the use of lasers on AF ranges can be found in AFI 13-212, *Range Planning and Operations*, ANSI Z136.6, *American National Standard for Safe Use of Lasers Outdoors*. Additional guidance can be found in Military Handbook 828A, *Laser Safety on Ranges and in Other Outdoor Areas*.

3.7.2.2. Range operations involving the use of lasers shall comply with AFI 13-212 and AFI 36-2226 as applicable.

3.7.2.3. Lasers and high intensity lights may adversely impact military aircraft operations by temporarily flash-blinding or distracting aircrew during critical phases of flight. Guidance to control hazards associated with these operations on a range can be found in United States Department of Transportation, FAA Order 7400.2G and ANSI Z136.6. The illumination of military aircraft from lasers or high intensity lights is a mandatory reportable event, and requires notification to the applicable MAJCOM, COCOM, AFRC, ANG Operations Directorate or equivalent and also requires coordination with local and federal investigators.

3.7.2.4. Use of lasers or laser systems, regardless of classification, that have the potential to propagate above the horizon requires coordination with US Strategic Command (USSTRATCOM) Laser Clearinghouse (LCH) IAW DoDI 3100.11 and SI 534-12. Exceptions are hand-held lasers, laser ranging and targeting systems developed for air-to-ground or ground-to-ground applications, and laser glint from all targets (space based, water based, air based, and ground based). Refer to the current MIL-STD-828B for

specifics on conducting laser testing. For information on coordination or submission of a LCH Laser Registration Form for approval or waiver, the LCH can be contacted via VOICE: (U) 805-606-1075/1282, DSN 276-1075/1282; FAX: (U) 805-606-1610, DSN 276-1610.

3.8. Combat Simulation Laser Systems.

3.8.1. The output power of lasers or laser systems used in force-on-force training shall be limited to those systems whose hazard classification is equal to or lower than Class 3R (or equivalent), and may require LEP as determined by the ILSO. Examples would include lasers and laser systems such as MILES and Havis-Shield.

3.8.2. Contact the ILSO to determine hazards and controls prior to fielding combat simulation laser systems.

3.8.3. Users of these systems shall be trained initially (prior to first use) and annually on hazards and controls.

3.8.4. As with other military specific lasers, units possessing these systems shall maintain accountability and ensure that no combat simulation laser system is released outside of the AF unless it is going to another service that has approved the use of the system, has been brought into full compliance with 21 CFR 1040.10 & 1040.11 and the compliance paperwork filed with the FDA, or destroyed IAW with DODI 4160.21-M.

3.9. Military Specific Lasers.

3.9.1. Military specific lasers may be exempt from 21 CFR, Part 1040.10, and Part 1040.11 requirements, and lack certain safety controls if necessary. It is therefore critical that users of these systems understand the hazards of the devices they are using and the alternate control measures approved by the AF LSSRB.

3.9.1.1. Military specific lasers shall adhere to approved user OIs, TTPs, SOPs, and CONOPs/CONEMPs.

3.9.1.2. Military specific lasers shall only be used by individuals who are trained in the safe use of the device.

3.9.1.3. Targets shall be positively identified and situational awareness maintained during military specific laser operations and training to avoid unintended exposures to personnel.

3.9.1.4. LEP, appropriate for the military specific lasers, shall be worn IAW the AF LSSRB approval letter.

3.10. (Added-AFSOC) Education for Aircrews and Special Tactics (ST).

3.10.1. (Added-AFSOC) Aircrew and ST personnel should have a basic working knowledge of laser function and how lasers may adversely impact mission performance.

3.10.2. (Added-AFSOC) Aircrews and ST should be educated on: (1) threats lasers impose on both the human weapon system and mechanical sensors, (2) specific systems employed by the unit, (3) specific threats that exist today and countermeasures available to mitigate those threats, and (4) how to “reflexively” respond to a laser exposure.

3.10.3. **(Added-AFSOC)** Aircrew also require education on the proper notification of MAJCOM, investigations, and how to seek medical attention at AFSOC Military Treatment Facilities (MTFs) as well as non-AFSOC and civilian treatment facilities. (T-2).

3.11. (Added-AFSOC) Special Tactics.

3.11.1. **(Added-AFSOC)** The 720 and 724 Special Tactics Group (STG) Surgeons should obtain Unit LSO training.

3.11.2. **(Added-AFSOC)** At least one member of each AFSOC Special Tactics Squadron (STS) should be trained as an AFSOC Unit LSO IAW Attachment 5. Reporting requirements are maintained for STG members while deployed.

Chapter 4

AIR FORCE APPROVAL OF LASERS AND LASER SYSTEMS

4.1. Establishment of Laser Safety Review Requirements. Under DoDI 6055.15, each DoD component shall establish a service specific laser safety review process to provide a system's safety review of all lasers used in combat, combat training, or classified in the interest of national security. This chapter outlines the process by which the AF shall meet this requirement.

4.1.1. Acquisition/Fielding Requirements for Military Specific Lasers. Any laser or laser system which meets the description of a military specific laser, as defined in paragraph 1.1.1. of this instruction, regardless of whether the laser is FDA Compliant, shall meet the following criteria, prior to acquisition or fielding:

4.1.1.1. The requesting organization shall obtain a letter of approval from the AF LSSRB through AFSEC/SEW. If a laser is considered a DEW per AFI 91-401, then the requesting organization shall obtain a letter of approval from the AF DEW Certification Board (DEWCB) per AFI 91-401.

4.1.1.2. The manufacturer shall obtain, through the requesting organization, a DoD exemption notification from the AF LSSRB (or from the DEWCB with AF/JAO concurrence if the laser is a DEW, per AFI 91-401) through AFSEC/SEW if the laser or laser system does not fully comply with the 21 CFR, Part 1040.10 and Part 1040.11. This same process shall be followed prior to the selling, distributing, lending, or turning over the device to the AF for RDT&E, IAW FDA Exemption.

4.1.1.3. The laser design shall meet the requirements of MIL-STD-1425A.

4.1.1.4. The requesting organization shall apply Risk Management (RM) to develop CONOPS/CONEMPS, TTPs or equivalent and other written instructions to prevent overexposures from lasers to DoD personnel and the public. Written procedures shall clearly spell out controls, employment conditions, and procedures in the event of an accident/incident.

4.1.1.5. The requesting organization shall notify the LSSRB if the laser is intended to be pointed above the horizon, so that the LCH evaluations can be accomplished.

4.1.2. Acquisition Requirements for FDA-Compliant Lasers. Any Class 1M, 2M, 3R, 3B, 4 laser, or laser system (or equivalent) which meets the description of a FDA-Compliant Laser as defined in paragraph 1.1.2. of this instruction is subject to the following criteria:

4.1.2.1. The Installation Commander shall serve as the final approval authority for the acquisition of all FDA-Compliant Lasers (or equivalent), unless otherwise delegated through installation policy.

4.1.2.2. The Installation Commander and ILSO should develop policy governing the acquisition, review, and use of FDA-compliant lasers on the installation.

4.1.2.3. The unit should coordinate with the ILSO, prior to acquiring any FDA-compliant lasers (or equivalent), to ensure local policy adherence and determine if the device is safe for use on the installation.

4.1.2.4. The ILSO should make recommendations for approval/disapproval to the Installation Commander regarding all FDA-Compliant Lasers.

4.2. AF LSSRB. The AF LSSRB serves as the AF body appointed the authority to certify military specific lasers procured by the AF meet all federal, DoD, and AF laser safety regulations and design requirements prior to acquisition and fielding.

4.2.1. Chair. AFSEC/SEW shall chair or appoint a chair, and coordinate the review of a military specific laser with the AF LSSRB members.

4.2.2. Voting Members. In addition to Air Force Safety Center Weapons Safety Division (AFSEC/SEW), representatives from AFMSA/SG3PB, 711HPW/RHDO, Air Force Operational Test and Evaluation Center, Safety (AFOTEC/SE), USAFSAM/OE, USAFSAM Aeromedical Consultation Service, Aerospace Ophthalmology Branch (USAFSAM/FEC), AF/JAO, Air Combat Command, Director of Requirements, Electronic Warfare, Information Operations, Directed Energy Division (ACC/A8I), AFRL Directed Energy Directorate, Laser Division (AFRL/RDL), and HQ AFMC Safety (AFMC/SES) shall serve as voting members to the AF LSSRB. Representatives from 648th Aeronautical Systems Squadron (648 AECS/CC) and AFRL Hardened Materials Branch (AFRL/RXPJ) shall participate as voting members when the military specific laser requires upgrades to existing LEP capabilities or otherwise requires integration with existing Life Support Equipment.

4.2.3. For lasers (other than DEW) intended for joint use, the AF LSSRB shall collaborate with the other services' laser safety review boards and authorities under the Joint Service Laser Safety Review Process to harmonize test requirements, increase efficiency, and ensure that laser safety reviews result in one set of joint service findings. The AF LSSRB shall serve as the single AF point of official communication to the FDA for all issues associated with laser approvals and the FDA exemption process. The AF DEWCB shall perform the same roles for DEW intended for joint use as part of the Joint Service Weapon Safety Review Process.

4.3. AF LSSRB Approval and DoD Exemption Process. To obtain a letter of approval and a DoD exemption notification (if applicable) from the AF LSSRB for any military specific laser the following criteria shall be met prior to acquisition, fielding, or the manufacturer's sale of the device to the AF:

4.3.1. The requesting organization shall submit on behalf of the manufacturer, through their MAJCOM (or equivalent), a request to AFSEC/SEW for a letter of approval and DoD exemption notification (if applicable). The most likely requesting organization will be the MAJCOM Director of Operations (or equivalent).

4.3.2. For military specific lasers in development, early interface with the AFSEC/SEW is recommended to ensure appropriate safety input into system designs and operations to meet federal regulations and DoD requirements. AFSEC/SEW should be involved prior to a Milestone C or COTS purchase review of the system to ensure no safety issues prevent Low-Rate Initial Production (LRIP).

4.3.3. The requesting SPO, PEO or PM organization shall coordinate with an AFSEC/SEW designated organization to have an independent laser system hazard evaluation conducted prior to submission to the AF LSSRB.

4.3.4. The requesting organization shall provide the following to AFSEC/SEW a minimum of 60 days prior to submission to the AF LSSRB:

- 4.3.4.1. The independent laser system hazard evaluation;
- 4.3.4.2. CONOPs, CONEMPs, or TTPs;
- 4.3.4.3. System Technical Orders or manufacturer's use & maintenance instructions;
- 4.3.4.4. SOPs;
- 4.3.4.5. Description of system specific user training identifying primary and ancillary hazards associated with the military specific laser;
- 4.3.4.6. Justification for each design requirement for which a military specific laser cannot meet MIL-STD-1425A requirements;
- 4.3.4.7. Legal review (if necessary IAW AFI 51-402, Weapons Review);
- 4.3.4.8. Test results of development and/or operational testing (if applicable);
- 4.3.4.9. Additional health and safety data not included in the laser system hazard evaluation.

4.3.5. Once the AF LSSRB review is complete, the AF LSSRB Chair shall provide an approval or disapproval letter to the requesting organization. The AF LSSRB approval letter shall state whether a DoD exemption notification was issued, and whether the laser has a waiver from the LCH or if LCH coordination is required for above the horizon emissions.

4.3.6. If a DoD exemption notification is issued for a military specific laser, a copy shall be provided to the manufacturer, and it is recommended the requesting organization maintain a copy.

4.4. Laser Temporary Approval for Emergency Operational Capability (EOC).

4.4.1. If an EOC is requested by combatant commands, the requesting organization shall submit a laser temporary approval package to AFSEC/SEW for expedited review by the AF LSSRB. The AF LSSRB will consider the urgency of the request and the completeness of technical review and documentation in its consideration of whether and for how long to grant temporary approval.

4.4.2. The laser temporary approval package submitted to AFSEC/SEW shall include as many of the following documents as practical:

- 4.4.2.1. An AFSEC/SEW approved Preliminary Hazard Analysis and MIL-STD-1425A Checklist;
- 4.4.2.2. CONOPs, CONEMPs, or TTPs for the intended use of the military specific laser;
- 4.4.2.3. SOPs;
- 4.4.2.4. Description of system specific user training identifying primary and ancillary hazards associated with the laser;
- 4.4.2.5. A Letter of Intended Evaluation by an AFSEC/SEW approved organization, to document the requesting organization has scheduled an independent laser system hazard

evaluation to ensure efforts are made to meet AF LSSRB approval requirements in conjunction with fielding the system under a waiver;

4.4.2.6. A letter from the requesting organization outlining the operational necessity, the scope of intended use, and period of time required for the temporary laser approval;

4.4.2.7. A copy of manufacturer's DoD exemption notification, issued by the AF LSSRB, grants the manufacturer the legal right to sell the military specific laser to the AF. If the device is FDA compliant, the requesting organization must provide the FDA accession number as proof that compliance has been certified by the FDA.

4.4.3. If approved, AFSEC/SEW shall provide a temporary approval, with a termination date, to the requesting organization. After that date, if permanent approval or extended temporary approval has not been granted, AF personnel shall cease use of the laser.

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Deputy Surgeon General

(AFSOC)

TIMOTHY D. ROBINETTE, Col, USAF, MC, CFS
Command Surgeon

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

5 USC 552a (Public Law 93-579) – *Privacy Act of 1974* ([http://uscode.house.gov/uscode-cgi/fastweb.exe?getdoc+uscview+t05t08+27+0++\(Debt%20Colle\)](http://uscode.house.gov/uscode-cgi/fastweb.exe?getdoc+uscview+t05t08+27+0++(Debt%20Colle)))

AAPM Report No. 73, *Medical Lasers: Quality Control, Safety Standards, and Regulations*, Oct 2001 (http://www.aapm.org/pubs/reports/RPT_73.PDF)

AFI 10-206, *Operational Reporting*, 6 Sep 2011 (<http://www.e-publishing.af.mil/shared/media/epubs/AFI10-206.pdf>)

AFI 11-301, Volume 4, *Aircrew Laser Eye Protection (ALEP)*, 17 Feb 2010 [Certified Current, 17 Feb 2010] (<http://www.e-publishing.af.mil/shared/media/epubs/AFI11-301V4.pdf>)

AFI 13-112V1, *Joint Terminal Attack Controller (JTAC) Training Program*, 15 Feb 2008, [Incorporating Change 1, 4 May 2009] (<http://www.e-publishing.af.mil/shared/media/epubs/AFI13-112V1.pdf>)

AFI 13-112V2, *Joint Terminal Attack Controller (JTAC) Standardization/Evaluation Program*, 21 Feb 2008 [Incorporating Change 1, 18 May 2009] (<http://www.e-publishing.af.mil/shared/media/epubs/AFI13-112V2.pdf>)

AFI 13-212, *Range Planning and Operations*, 16 Nov 2007 [Incorporating Change 1, 10 Jul 2008; Certified Current, 6 Jan 2010] (<http://www.e-publishing.af.mil/shared/media/epubs/AFI13-212.pdf>)

AFI 48-101, *Aerospace Medicine Operations*, 19 Oct 2011 (<http://www.e-publishing.af.mil/shared/media/epubs/AFI48-101.pdf>)

AFI 48-123, *Medical Examinations and Standards*, 24 Sep 2009 [Incorporating Change 2, 18 Oct 2011] (<http://www.e-publishing.af.mil/shared/media/epubs/AFI48-123.pdf>)

AFI 48-145, *Occupational and Environmental Health Program*, 15 Sep 2011 (<http://www.e-publishing.af.mil/shared/media/epubs/AFI48-145.pdf>)

AFI 63-101, *Acquisition and Sustainment Life Cycle Management*, 8 Apr 2009 [Incorporating Change 4, 3 Aug 2011] (<http://www.e-publishing.af.mil/shared/media/epubs/AFI63-101.pdf>)

AFI 90-201, *Inspector General Activities*, 4 Apr 2012 (<http://www.e-publishing.af.mil/shared/media/epubs/AFI90-201.pdf>)

AFI 90-801, *Environment, Safety, and Occupational Health Councils*, 25 Mar 2005 [Certified Current, 29 Dec 2009] (<http://www.e-publishing.af.mil/shared/media/epubs/afi90-801.pdf>)

AFI 91-202, *The US Air Force Mishap Prevention Program*, 5 Aug 2011 [Incorporating Change 1, 20 Mar 2012] (<http://www.e-publishing.af.mil/shared/media/epubs/AFI91-202.pdf>)

AFI 91-204, *Safety Investigations and Reports*, 24 Sep 2008 (<http://www.e-publishing.af.mil/shared/media/epubs/AFI91-204.pdf>)

AFI 91-401, *Directed Energy Weapons Safety*, 29 Sep 2008 (<http://www.e-publishing.af.mil/shared/media/epubs/AFI91-401.pdf>)

AFMAN 33-363, *Management of Records*, 1 Mar 2008 [Incorporating Change, 9 Apr 2012] (<http://www.e-publishing.af.mil/shared/media/epubs/AFMAN33-363.pdf>)

AFOSH Std 91-5, *Welding, Cutting, and Brazing*, 1 May 1997 [Certified Current, 6 Mar 2012] (<http://www.e-publishing.af.mil/shared/media/epubs/AFOSHSTD91-5.pdf>)

AFOSH Std 91-66, *General Industrial Operations*, 1 Oct 1997 [Certified Current, 6 Jan 2012] (<http://www.e-publishing.af.mil/shared/media/epubs/AFOSHSTD91-66.pdf>)

AFOSH Std 91-501, *Air Force Consolidated Occupational Safety Standard*, 7 Jul 2004, [Certified Current, 8 Jan 2012] (<http://www.e-publishing.af.mil/shared/media/epubs/AFOSHSTD91-501.pdf>)

AFPD 48-1, *Aerospace Medicine Enterprise*, 23 Aug 2011 (<http://www.e-publishing.af.mil/shared/media/epubs/AFPD48-1.pdf>)

AFPD 91-4, *Directed Energy Weapons (DEW) Safety*, 21 Oct 2011 (<http://www.e-publishing.af.mil/shared/media/epubs/AFPD91-4.pdf>)

AFRL-SA-BR-2008-0002, *USAF School of Aerospace Medicine Laser Injury Guidebook*, Sep 2008 (<http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA503011&Location=U2&doc=GetTRDoc.pdf>)

ANSI Z136.1-2007, *American National Standard for Safe Use of Lasers*, (<http://webstore.ansi.org/RecordDetail.aspx?sku=ANSI+Z136.1-2007>)

ANSI Z136.3-2011, *Safe Use of Lasers in Health Care Facilities*, (<http://webstore.ansi.org/RecordDetail.aspx?sku=ANSI+Z136.3-2011>)

ANSI Z136.4-2010, *Recommended Practice for Laser Safety Measurements for Hazard Evaluation*, (<http://www.webstore.ansi.org/RecordDetail.aspx?sku=ANSI+Z136.4-2010>)

ANSI Z136.6-2005, *Safe Use of Lasers Outdoors*, (<http://webstore.ansi.org/RecordDetail.aspx?sku=ANSI+Z136.6-2005>)

ANSI/NEMA Z535.4:2011, *Product Safety Signs and Labels*, (<http://www.webstore.ansi.org/RecordDetail.aspx?sku=ANSI%2fNEMA+Z535.4-2011>)

DOD Directive 5400.11, *DoD Privacy Program*, 8 May 2007 [Incorporating Change 1, 1 Sep 2011] (<http://www.dtic.mil/whs/directives/corres/pdf/540011p.pdf>)

DoDI 4160.21, *Defense Material Disposition Manual*, 18 Aug 1997 (<http://www.dtic.mil/whs/directives/corres/pdf/416021m.pdf>)

DoDI 5000.02, *Operation of the Defense Acquisition System*, 8 Dec 2008 (<http://www.dtic.mil/whs/directives/corres/pdf/500002p.pdf>)

DoDI 5000.69, *DoD Joint Services Weapon and Laser System Safety Review Processes*, 9 Nov 2011 (<http://www.dtic.mil/whs/directives/corres/pdf/500069p.pdf>)

DoDI 6055.1, *DoD Safety and Occupational Health (SOH) Program*, 19 Aug 1998 (<http://www.dtic.mil/whs/directives/corres/pdf/605501p.pdf>)

DoDI 6055.15, *DoD Laser Protection Program*, 4 May 2007 (<http://www.dtic.mil/whs/directives/corres/pdf/605515p.pdf>)

DoDI 6490.03, *Deployment Health*, 11 Aug 2006 [Certified Current, 30 Sep2011]
(<http://www.dtic.mil/whs/directives/corres/pdf/649003p.pdf>)

FAA Advisory Circular 70-1, *Outdoor Laser Operations*, 30 Dec 2004
([http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/list/AC%2070-1/\\$FILE/AC70-1.pdf](http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/list/AC%2070-1/$FILE/AC70-1.pdf))

FAA Advisory Circular 70-2, *Reporting of Laser Illumination of Aircraft*, 11 Jan 2005
([http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/list/AC%2070-2/\\$FILE/AC%2070-2.pdf](http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/list/AC%2070-2/$FILE/AC%2070-2.pdf))

FDA Exemption No. 76EL-01, *Department of Defense Exemption from the FDA Performance Standard for Laser Products*, 1976

FDA Laser Notice No. 52, *Guidance on the Department of Defense Exemption from the FDA Performance Standard for Laser Products*, 12 Jul 2002
(<http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/ucm094416.htm>)

FAA Order JO 7400.2J, *Procedures for Handling Airspace Matters*, 9 Feb 2012
(<http://www.faa.gov/documentLibrary/media/Order/AIR.pdf>)

HAF Mission Directive (MD) 1-18, *Assistant Secretary of the Air Force (Installations, Environment And Logistics)*, 4 Mar 2009 (<http://www.e-publishing.af.mil/shared/media/epubs/HAFMD1-18.pdf>)

IEC 60825–1 Edition 2.0, *Safety of Laser Products - Part 1: Equipment Classification and Requirements*, Mar 2007
(<http://webstore.iec.ch/webstore/webstore.nsf/artnum/037864?opendocument>)

IEC 60825–2-am1 Edition 3.0, *Safety of Laser Products - Part 2: Safety of Optical Fiber Communication Systems (OFCS)*, 9 Nov 2006
(<http://webstore.iec.ch/webstore/webstore.nsf/artnum/037217?opendocument>)

Joint Pub 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 8 Nov 2010
As Amended Through 15 Apr 2012 (http://www.dtic.mil/doctrine/new_pubs/jp1_02.pdf)

Joint Pub 3-09, *Joint Fire Support*, 30 Jun 2010
(http://www.dtic.mil/doctrine/new_pubs/jp3_09.pdf)

Joint Pub 3-09.3, *Close Air Support*, 8 Jul 2009
(https://jdeis.js.mil/jdeis/new_pubs/jp3_09_3.pdf)

Joint Space Operations Center, *Laser Clearinghouse Reports Handbook*,
(Contact LCH via VOICE: (U) 805-606-1075/1282, DSN 276-1075/1282; FAX: (U) 805-606-1610, DSN 276-1610)

Mil Hdbk 828B, *Range Laser Safety*, 9 Mar 2011 [Incorporating Change 1, 5 May 2011]
(https://assist.daps.dla.mil/quicksearch/basic_profile.cfm?ident_number=110720)

MIL-STD-882E, *Department of Defense Standard Practice for System Safety*, 11 May 2012
(https://assist.daps.dla.mil/quicksearch/basic_profile.cfm?ident_number=36027)

MIL-STD-1425A, Safety Design Requirements for Military Lasers and Associated Support Equipment, 30 Aug 1991

(https://assist.daps.dla.mil/quicksearch/basic_profile.cfm?ident_number=36858)

NFPA Std 115, *Standard for Laser Fire Protection, 2012*

(<http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=115&cookie%5Ftest=1>)

Threshold Limit Values (TLVs[®]) and Biological Exposure Indices (BEIs[®]), *American Conference of Governmental Industrial Hygienists (ACGIH[®]), 2010 Edition*

(<http://www.acgih.org/store/ProductDetail.cfm?id=2105>)

Title 21, Code of Federal Regulations (21 CFR), *Food and Drugs, Subchapter J--Radiological Health, Part 1040 - Performance Standards for Light-Emitting Products*

(<http://www.gpo.gov/fdsys/pkg/CFR-2007-title21-vol1/content-detail.html>)

Part 1040.10, *Laser Products*

Part 1040.11, *Specific Purpose Laser Products*

Title 29, Code of Federal Regulations (29 CFR), *Labor, Subchapter D--Occupational Health and Environmental Controls, Part 1926.54 – Non-Ionizing Radiation*

Uniform Code of Military Justice (UCMJ)

(<http://www.constitution.org/mil/ucmj19970615.htm>)

US Army TB Med 524, *Control of Hazards to Health from Laser Radiation, Jan 2006*

(http://www.army.mil/usapa/med/DR_pubs/dr_a/pdf/tbmed524.pdf)

(Added-AFSOC) *USAFSAM Laser Injury Guidebook 2012*

(Added-AFSOC) *Prescribed Forms*

(Added-AFSOC) No forms are prescribed in this publication.

Adopted Forms

(Added-AFSOC) AF Form 55, *Employee Safety and Health Record, 5 Aug 2011*

(Added-AFSOC) AF Form 847, *Recommendation for Change of Publication, 22 Sep 2009*

Abbreviations and Acronyms

AAPM—American Association of Physicists in Medicine

ACC—Air Combat Command

ACGIH[®]—American Conference of Governmental Industrial Hygienists

(Added-AFSOC) **ACU**—Ambulatory Care Unit

AESG—Aeronautical Systems Group

AF—Air Force

AFIA—Air Force inspection Agency

AF LSSRB—Air Force Laser Systems Safety Review Board

AFI—Air Force Instruction
AFMAN—Air Force Manual
AFMC—Air Force Materiel Command
AFMSA—Air Force Medical Support Agency
AFOSH—Air Force Occupational Safety and Health
AFPD—Air Force Policy Directive
AFRC—Air Force Reserve Command
AFSAS—Air Force Safety Automated System
AFSC—Air Force Specialty Code
AFSEC—Air Force Safety Center
ANG—Air National Guard
ANSI—American National Standard Institute
(Added-AFSOC) AOC—Air Operations Center
BE—Bioenvironmental Engineering
CFR—Code of Federal Regulation
COCOM—Combat Command
CONEMPS—Concepts of Employment
CONOPS—Concepts of Operations
COTS—Commercial Off the Shelf
DEW—Directed Energy Weapon
DOD—Department of Defense
DODI—Department of Defense Instruction
DRU—Direct Reporting Units
EOC—Emergency Operational Capability
ESOH—Environmental, Safety, and Occupational Health
FAA—Federal Aviation Agency
FDA—Food and Drug Administration
FOA—Field Operating Agency
FSO—Flight Surgeon’s Office
HAF—Headquarters Air Force
HQ—Headquarters
IAW—In Accordance With

ICNIRP—International Commission on Non-Ionizing Radiation Protection

(Added-AFSOC) IDMT—Independent Duty Medical Technician

IEC—International Electrotechnical Commission

IEEE—Institute of Electrical and Electronics Engineers

ILSO—Industrial Laser Safety Officer

IPE—Individual Protective Equipment

JA—Judge Advocate

LCH—Laser Clearinghouse

LEP—Laser Eye Protection

LRIP—Low-Rate Initial Production

LSO—Laser Safety Officer

MAJCOM—Major Command

MD—Mission Directive

MILES—Multiple Integrated Laser Engagement System

MIL-HDBK—Military Handbook

MIL-STD—Military Standard

MPE—Maximum Permissible Exposure

MTF—Military Treatment Facility

NDI—Non-Developmental Item

NFPA—National Fire Protection Association

NHZ—Nominal Hazard Zone

nm—Nanometer

NOHD—Nominal Ocular Hazard Distance

NSHD—Nominal Skin Hazard Distance

(Added-AFSOC) NVG—Night Vision Goggle

OD—Optical Density

OEH—Occupational and Environmental Health

OEHWG—Occupational and Environmental Health Working Group

OI—Operational Instruction

OJT—On the Job Training

ORM—Operational Risk Management

OSHA—Occupational Safety and Health Administration

(Added-AFSOC) OSM—Operational Support Medical

PEO—Program Executive Officer

PH—Public Health

PHA—Preliminary Hazard Analysis

PM—Program Manager

PPE—Personal Protective Equipment

PTR—Primary Training Range

RDS—Records Disposition Schedule

RDT&E—Research, Development, Test & Evaluation

ROA—Range Operating Authority

SAF—Secretary of the Air Force

SEG—Safety

(Added-AFSOC) SOG—Special Operations Group

SOP—Standard Operating Procedure

SPO—System Program Office

SSN—Social Security Number

(Added-AFSOC) ST—Special Tactics

STANAG—Standardization Agreement

STD—Standard

(Added-AFSOC) STG—Special Tactics Group

TLV®—Threshold Limit Value

TO—Technical Order

TTP—Tactics, Techniques, and Procedures

(Added-AFSOC) ULSO—Unit Laser Safety Officer

USAF—United States Air Force

USAFSAM—United States Air Force School of Aerospace Medicine

USD (AT&L)—Under Secretary of Defense for Acquisition, Technology, and Logistics

USSTRATCOM—United States Strategic Command

Terms

Shall—The word *shall* is to be understood as mandatory.

Should—The word *should* is to be understood as advisory.

Critical Zone—Volume of airspace where visual interference by a visible laser beam would compromise safety due to interruption of necessary performance of critical tasks.

Glare—Obscuration of an object in a person's field of vision due to a bright light source located near the same line of sight.

Flashblindness—A visual interference effects that persists after the source of illumination has been removed.

High Energy Laser—For this instruction, a laser that have output power greater than 1 kilowatt (kW) for longer than a second or output energy greater than 1 kilojoule (kJ) per pulse.

Laser—An acronym for Light Amplification by Stimulated Emission of Radiation. Any device that can be made to produce or amplify electromagnetic radiation in the x-ray, UV, visible, and infrared or other portions of the spectrum by the process of controlled stimulated emission of photons.

Laser Free Zone—A designated area or volume of airspace where any extraneous visible optical radiation could interfere with safety.

Laser Safety Officer—An individual designated in writing whom is responsible for implementing a laser safety program and enforcing control of laser hazards within their area of responsibility.

Maximum Permissible Exposure (MPE)—The level of laser radiation to which a person may be exposed without hazardous effect or adverse biological changes in the eye or skin.

Military Specific Lasers—Lasers designed for actual combat, combat training operations, or classified in the interest of national security shall be exempted from the requirements of 21 CFR 1040.10 and 1040.11.

Nominal Hazard Zone (NHZ)—The space in which laser radiation during operations exceeds the applicable MPE including direct beam and reflected beams. Personnel within this zone shall be provided PPE (e.g., LEP) and training for its use.

Nominal Ocular Hazard Distance (NOHD)—The distance from the output aperture along beam propagation beyond which irradiance or radiant exposure is not expected to exceed the appropriate MPE for unobstructed viewing by the human eye. The NOHD may increase with the use of aided viewing.

Nominal Skin Hazard Distance (NSHD)—The distance from the output aperture along beam propagation beyond which irradiance or radiant exposure is not expected to exceed the appropriate MPE for unobstructed exposure to the skin.

Threshold Limit Value (TLV®)—For visible, near-infrared, and UV radiation, TLVs® represent conditions under which it is believed that nearly all workers may be exposed without adverse health effects. Values should be used only as guides in the control of exposures and should not be regarded as fine lines between safe and dangerous levels **Sensitive Zone**—All areas outside the critical zone(s) that flight or range operations have identified as needing protection due to high visual workload. The sensitive zone may or may not be contiguous or concentric with a critical zone.

Visual Interference Level—A visible laser beam, with irradiance less than the MPE can produce a visual response that interferes with the safe performance of sensitive or critical tasks

by aircrews or other personnel. This level varies in accordance with the particular zone the laser is operating in and where it is directed. Zones include laser-free, critical and sensitive.

Attachment 2

TRAINING

A2.1. Training Documentation. Training will be documented on AF Form 55, Employee Safety and Health Record.

A2.2. Installation Laser Safety Officer (ILSO). An ILSO shall meet the following criteria:

A2.2.1. An ILSO must have training commensurate with the types of laser systems that are present or associated with their installations.

A2.2.1.1. LSO knowledge topics required by the ANSI Z136 Series:

A2.2.1.1.1. Laser safety training topics for Class 3B and 4 users should include but are not limited to:

A2.2.1.1.1.1. Fundamentals of laser operation to include physical principles, construction, etc.;

A2.2.1.1.1.2. Bioeffects of laser radiation on the eye and skin;

A2.2.1.1.1.3. Significance of specular and diffuse reflections;

A2.2.1.1.1.4. Non-beam hazards of lasers;

A2.2.1.1.1.5. Laser and laser system classifications;

A2.2.1.1.1.6. Control measures;

A2.2.1.1.1.7. Overall responsibilities of management and employee;

A2.2.1.1.1.8. Medical surveillance practices;

A2.2.1.1.1.9. CPR for personnel servicing lasers with the capability of exposure to high voltage;

A2.2.1.1.1.10. Procedures to follow in case of a suspected laser incident.

A2.2.1.1.2. Additional laser safety training topics for individuals responsible for laser safety program, evaluation of hazards and implementation of control measures may include but are not limited to:

A2.2.1.1.2.1. Laser terminology;

A2.2.1.1.2.2. Types of lasers, wavelengths, pulse shapes, modes, power/energy;

A2.2.1.1.2.3. Basic radiometric units and measurement devices;

A2.2.1.1.2.4. MPEs;

A2.2.1.1.2.5. Laser hazard evaluations and other calculations;

A2.2.1.1.2.6. Optical radiation hazard identification and evaluation;

A2.2.1.1.2.7. Additional training topics can be coordinated with the 711 HPW and/or USAFSAM/OE.

A2.2.1.1.3. Optional laser safety training with potential topics for Classes 1M, 2, 2M and 3R include:

A2.2.1.1.3.1. Simple explanation of a laser and a comparison of the differences between laser light and other light sources;

A2.2.1.1.3.2. Explanation of the different laser classes and any potential viewing hazard that could exist if exposed to a laser for greater than the human aversion response time of 0.25 seconds.

A2.2.1.1.4. If it is determined that laser pointer awareness education is needed, suggested topics can include:

A2.2.1.1.4.1. Simple explanation of a laser;

A2.2.1.1.4.2. Compare difference of laser light from other light sources;

A2.2.1.1.4.3. Precautions for use;

A2.2.1.1.4.4. Effects of exposure;

A2.2.1.1.4.5. Misuse/FDA warning on misuse of pointers;

A2.2.1.1.4.6. FDA limit of 5 mW;

A2.2.1.1.4.7. Local ordinance limitations.

A2.2.2. ILSOs shall have training in the following Laser Safety Program elements:

A2.2.2.1. Establishing a laser safety program;

A2.2.2.2. Laser injury reporting and investigations;

A2.2.2.3. Laser program audits;

A2.2.2.4. Laser eye protection (military and commercial);

A2.2.2.5. AF process and requirements for military specific lasers;

A2.2.2.6. Federal, state, and local standards and regulations (OSHA, FAA, State, installation, ANSI, ACGIH, etc.);

A2.2.2.7. FAA and LCH requirements and coordination for outdoor use of lasers;

A2.2.2.8. Assist in the development of ULISO and user specific laser safety training;

A2.2.2.9. Specific laser safety issues related to types of laser activities performed on the installation, refer to paragraph A2.3 for examples.

A2.2.3. Bioenvironmental Engineers receive laser and optical radiation training in the USAFSAM Bioenvironmental Engineering Officers Course with the exception of the training outlined in **A2.2.1.1.2**. Technicians in locations without a full-time Bioenvironmental Engineer can attend the LSO portion of this officer course. This training is required for ILSOs that have the potential to calculate OD, NOHD and NHZ that are normally associated with installations that conduct research or have training ranges. The training outlined in **A2.2.1.1.2** can be web-based training from USAFSAM or procured from a commercial or DoD source that has been approved by AFMSA/SG3PB. For the ANG and AF Reserves, this LSO training requirement is effective with implementation of the USAFSAM web-based training expected to come on line by 2013.

A2.3. Unit Laser Safety Officer (ULSO). ULSOs may fall under one of the following categories: Aircrew LSO, Industrial LSO, Medical LSO, Range LSO, Research LSO, or Tactical LSO. A ULSO shall be able to demonstrate thorough laser safety knowledge within their specialized area of expertise as follows.

A2.3.1. The LSO Knowledge Topics required by the ANSI Z136 Series.

A2.3.2. Laser Hazards and Controls commensurate with the laser hazards accessible at the unit level.

A2.3.3. Establishing a Unit Laser Safety Program.

A2.3.3.1. Aircrew laser safety (if applicable to the unit). Aircrew LSOs will typically work in units where lasers are mounted to or used from aircraft and will require specialized knowledge on laser designation procedures, infrared pointing, laser footprints, laser surface danger zones, reflection hazards, and air-to-air lasing procedures.

A2.3.3.2. Industrial laser safety (if applicable to the unit). Industrial LSOs will typically work in units that use lasers to cut or weld materials, and will require specialized knowledge on the Laser Generated Air Contaminants (LGAC), and ancillary hazards that are produced by their lasers.

A2.3.3.3. Medical laser safety (if applicable to the unit). Medical LSOs will typically work in a medical facility and will require specialized knowledge on the LGAC, to include biological contaminants that are produced by their lasers.

A2.3.3.4. Range laser safety (if applicable to the unit). Range LSOs will typically be assigned to a research or training range and will require specialized knowledge on laser footprints, laser surface danger zones, reflection hazards and target maintenance.

A2.3.3.5. Research laser safety (if applicable to the unit). Research LSOs will typically be assigned to a research facility and will require specialized knowledge on optics, beam geometry, hazard calculations and possibly LGACs.

A2.3.3.6. Tactical laser safety (if applicable to the unit). Tactical LSOs will typically be assigned to a combat unit and will require specialized knowledge on laser designation procedures, infrared illumination and pointing, reflection hazards, and lack of controls for military specific lasers.

Attachment 3

CONTROL MEASURES

A3.1. Purpose. The purpose of control measures shall be to reduce the risks of exposure to the skin and eyes even with the presence of PPE, and to prevent exposure to visible laser radiation at levels that interfere with critical tasks. For this instruction, PPE is generally considered a tertiary control, to be used in the event other controls fail or cannot be implemented due to negative mission impact. The following requirements for laser hazard controls exceed those listed in the ANSI Z136 Series and shall be followed to ensure compliance with this instruction.

A3.2. Engineering Control Measures.

A3.2.1. Beam stop or attenuator. All Class 3B and Class 4 lasers shall be provided with a permanently attached beam stop or attenuator. (NOTE: The same exception to this requirement listed in the ANSI Z136 Series applies to this instruction.)

A3.2.2. Activation warning systems. An activation warning system shall be used with all Class 3B and Class 4 lasers. Compliance with this requirement is not required if the activation warning system can negatively affect the mission use of the laser or laser system (typically refers to military specific lasers, which have DoD exemption notifications).

A3.2.3. Laser area warning signs and activation warnings. All Class 3R, 3B, and 4 lasers shall adhere to the laser area warning signs and activation warnings criteria described in ANSI Z136.1, except in the event of mission employment of military specific lasers.

A3.3. Administrative and Procedural Controls.

A3.3.1. Standard operating procedures. The ILSO shall require and approve written SOPs for all Class 3B and Class 4 FDA-compliant lasers and military specific lasers approved by the AF LSSRB.

A3.3.2. Education and training. Education and training shall be provided for operators, maintenance, and service personnel for all Class 3B and Class 4 lasers. In addition, education and training shall be provided for the use of any military specific laser regardless of classification.

A3.3.3. Protective equipment. Appropriate protective equipment shall be provided for operators, maintenance, and service personnel using all Class 3B and Class 4 lasers. Refer to recommendations specified in Section 4 of ANSI Z136.1 for guidance.

A3.3.4. LEP. If the potential for overexposure to the eye exists, LEP shall be worn for all Class 3B and 4 lasers. AF ground personnel may acquire LEP through the military supply system or commercially. LEP, including visors and spectacles, may not be used by aircrew without a higher HQ Safe-to-Fly approval. Refer to recommendations specified in Section 4 of ANSI Z136.1 for guidance.

A3.3.5. Spectators. Spectators shall not be permitted within a laser controlled area which contains a Class 3B or Class 4 laser or laser system unless:

A3.3.5.1. Appropriate approval from the unit commander, with recommendations from the Installation/ULSO, has been obtained.

A3.3.5.2. The degree of hazard and avoidance procedure has been explained to all spectators.

A3.3.5.3. Appropriate protection measures are taken.

A3.3.5.4. All unit and installation requirements governing demonstrations have been followed.

A3.3.6. Protective barriers and curtains. A blocking barrier, screen, or curtain shall be used for all Class 3B and Class 4 lasers used in a laboratory, research, medical, or industrial center, and where possible outdoors. The ILSO can approve exceptions to this requirement based on the impact the operation of the laser or laser system has on critical tasks.

A3.3.7. Administrative controls shall also be employed within sensitive operating zones (such as near flight operations) to prevent exposures to visible lasers that interfere with critical tasks.

Attachment 4

INVESTIGATION OF PERSONNEL FOLLOWING SUSPECTED OVEREXPOSURE

A4.1. Personnel Overexposures. In the event of a suspected overexposure of an individual to laser or optical radiation, the following steps will be taken:

A4.1.1. The Flight Surgeon's Office (FSO) shall coordinate the event with the ILSO. In the absence of an ILSO, the FSO shall coordinate the event directly with AFMSA/SG3PB and, as appropriate, with the MAJCOM/SG, USAFSAM/FECO, USAFSAM/OE, and the Tri-Service Laser Injury Hotline.

A4.1.2. The workplace supervisor shall be notified immediately and ensure action is taken to prevent injury to other personnel. The laser or optical radiation source shall be taken out of service until the accident/incident has been investigated and corrective actions made, as necessary.

A4.1.3. Exposed individuals shall seek medical care immediately at the closest medical treatment facility (MTF); a military MTF is preferred. Aircrew or other operational personnel who receive a laser exposure from friendly or hostile sources should report to the FSO or Squadron Medical Element, if available.

A4.1.3.1. The medical unit examines the patient and implements procedures for reporting and investigating occupational health occurrences. If the exposure was to the eye and a military optometrist/ophthalmologist is not available, the member shall be sent to a contract ophthalmologist or military optometrist/ophthalmologist at an alternate installation for examination.

A4.1.3.2. If the individual is not being cared for at an AF MTF; the host AF MTF shall ensure an AF physician contacts the attending physician immediately to coordinate required medical examinations and treatments.

A4.1.3.3. MTFs shall report any injuries to SEG as required. Safety personnel shall ensure additional reporting is accomplished IAW current requirements. A flight surgeon and/or aerospace physiologist shall conduct a human factors evaluation of the incident/accident.

A4.1.3.4. The ILSO shall notify the installation SEG, PH, JA, and applicable MAJCOM, AFRC, or ANG medical staff.

A4.1.3.5. In the case of an exposure to a military or civil service member at an ANG base, the ANG medical unit shall make every attempt to contact the attending physician within 24 hours to determine if medical referral to a military MTF is required.

A4.1.4. The workplace supervisor shall notify the unit commander, safety officer, ULSO and ILSO within 8 hours of the accident/incident.

A4.1.5. The ILSO shall notify the Tri-Service Laser Injury Hotline (1-800-473-3549) and forward a completed DoD laser accident/incident reporting form within 3 duty days following a laser accident/incident because immediate indicated care is critical. The DoD laser accident/incident reporting form can be found on the ESOH website (esoh.service.center@wpafb.af.mil) or by contacting the Tri-Service Laser Injury Hotline.

This form does not replace the required final report, nor does it replace the AF Form 190, Occupational Injury/Illness Report.

A4.1.6. Notify AFSEC and ensure initial mishap information is entered into the AF Safety Automated System (AFSAS) IAW timelines mandated in AFI 91-204.

A4.1.7. Additional information concerning laser injuries can be found in the USAFSAM Laser Injury Guidebook that is posted on the ESOH website.

A4.2. Investigation. Upon notification of a suspected exposure event identified in paragraph 3.6., the ILSO and/or Installation SEG respectively shall investigate to determine event characteristics, root cause, contributing factors, and corrective measures. The ILSO and/or Installation SEG shall involve the MTF, as needed. Indications of malicious intent require involvement of security forces in the investigation. This investigation is separate from, but may become a part of, a mishap investigation conducted under AFI 91-204; however, in addition to this instruction, accident/incident investigations shall mirror the guidance regarding mishap investigations in AFI 91-204. For personnel overexposures, the following information shall be determined:

A4.2.1. Name, rank, and Social Security Number (SSN) of individual(s) suspected to have been overexposed.

A4.2.2. Laser, broadband or other optical radiation source nomenclature, characteristics and operating parameters at the time of the incident/accident (wavelength, peak and average power, pulse width and frequency, beam diameter and divergence, etc.) including those parameters that may be classified, if pertinent to the investigation.

A4.2.3. Date, time, place, unit, duration of the exposure, and the individual's position relative to the laser/optical source.

A4.2.4. A thorough description of the events leading up to the accident/incident. A signed narrative statement shall be obtained from all individuals involved and/or having knowledge of the accident/incident.

A4.2.5. PPE and/or clothing in use at the time of the incident/accident. The wavelength and OD for which protection is afforded associated with any LEP in use, shall be annotated.

A4.2.6. Facility configuration at time of the event.

A4.2.7. Name, rank, address, and telephone number of the attending physician. If the attending physician is not an AF physician, give name, rank, title, address, and telephone number of the consulting AF physician.

A4.2.8. The event should be reconstructed, including measurements and calculations to estimate the exposure to the individual. If the equipment and expertise does not exist locally, support should be requested through the ESOH Hotline.

A4.2.9. Assessment of root-cause, confounding or contributing factors, and corrective measures to prevent re-occurrence.

A4.2.10. For exposure of aircrew personnel during flight, the in-flight laser illumination incident report in FAA Advisory Circular 70-2, Reporting of Laser Illumination of Aircraft, or ANSI Z136.6 Appendix A, is suggested to support exposure investigation.

A4.3. Final Report. Upon completion of the investigation and within 30 workdays, the ILSO shall forward a detailed report to Installation PH, BE, SEG, JA, MAJCOM BE, and AFMSA/SG3PB with a courtesy copy to ESOH Service Center for entry into the laser and optical radiation exposure investigation repository. The report should be done in AFSAS and shall include the following at a minimum:

A4.3.1. A summary of the estimated exposure.

A4.3.2. A time table of medical evaluations.

A4.3.3. A discussion of further medical follow-up recommendations.

A4.3.4. Copies of the reconstruction report.

A4.3.5. Copies of all narrative statements, medical evaluations, and/or human factors evaluation.

A4.3.6. Investigation findings.

A4.3.7. Recommendations to prevent recurrence.

A4.4. Individual Medical Records. The ILSO shall provide an unclassified copy of forms and reports, related to the investigation, to the medical records section for inclusion in each individual's medical record.

A4.5. Material Damage. For material damage, the installation safety office shall coordinate the event response with affected installation and MAJCOM offices.

Attachment 5 (Added-AFSOC)**AFSOC UNIT LASER SAFETY OFFICE COURSE OUTLINE AND GOALS**

Introduction

Laser Basics & Applications

Laser Safety Terminology

Common Units and Measures

Laser Hazard Analysis Overview

Regulations and Standards

Laser Safety Program Management

- Unit Laser Inventory requirement
- Actions to take if suspect lasing occurs
- Unit Laser Safety Awareness Training Requirements

Biological Effects

Laser Classifications & Control Measures

LEP Tutorial

Non-Beam Hazards

Range Issues (If applicable)

Laser Systems Associated within the Unit/Command

Goals of the Training:

Learn Reasons for Laser Safety

Learn Basic Laser Terminology

Learn About Spectrum of Light

Common Laboratory & Military Hazards Overview

Learn about Common Units and Measures

Basic Laser History

Become Familiar with Laser Standards

Learn Basic Biology of Laser Injury

Gain Familiarity with Laser Safety Control Measures

Become familiar with Common Laser Hazard Classification Schemes

Review Laser Hazards on USAF Ranges

Basics of Establishing a Laser Safety Program

Teach the Unit LSO their program management duties

Teach the Unit LSO and/or medic laser mishap response procedures